藤女子大学・藤女子短期大学紀要，第 27 号，第II部；35-40．平成元年．
Bull. Fuji Women's College, No. 27, Ser. II : 35-40. 1989.

RECORD OF A TROGLOBITIC PLANARIAN FROM TANETTE CAVE LOCATED IN THE MAROS KARST, SULAWESI (CELEBES), INDONESIA (TURBELLARIA, TRICLADIDA, PALUDICOLA)[1]

by

MASAHARU KAWAKATSU and ROBERT W. MITCHELL

Dr. L. DEHARVENG (Toulouse Cedex) graciously sent to KAWAKATSU a preserved collection of an interesting troglobitic planarian that a member of the "Expédition Maros 1988" collected in Gua (Cave) Tanette, located in southwestern Sulawesi (Celebes), Indonesia. According to Dr. DEHARVENG's information, the cave was discovered during the above-mentioned Expedition organized through the "Association Pyrénéenne de Spéléologie". It is a large cave with underground pools and stream, and is located in the northeastern part of the Maros Karst (see Figs. 1 and 2 ; ca. lat. 5°01′S. and long. 12°54′E). The altitude of the cave entrance is approximately 100 m.

The material, fixed in 70% ethanol, consisted of 3 small, white, eyeless specimens. They were collected in a small pool in the deep region of the cave. This collection has been designated as KAWAKATSU's Specimen Lot Nos. 1976 (collected on July 6, 1988 ; 2 specimens) and 1977 (collected on August 10, 1988 ; a single specimen). KAWAKATSU photographed these specimens, and he then cut all specimens in serial sagittal sections at 5 micrometers. Staining was done with Delafield's hematoxylin and erythrosin.

Unfortunately, none of the specimens in the Gua Tenette collection is sexual, so the species cannot be identified with certainty. Judging from the external appearance of the animal (especially the head shape), the authors tentatively designate it as *Dugesia* sp. (species of Sulawesi). Since this is the first record of freshwater planarian from Sulawesi, and is the second record of a true troglobite among *Dugesia* species from Suoutheast Asia, the following account of external features and pharyngeal histology are given in the present paper.

Order TRICLADIDA
Suborder PALUDICOLA or PROBURSALIA
Family D u g e s i i d a e BALL, 1974

1) Preliminary report of this paper was presented at the 60th Annual Meeting of the Zoological Society of Japan held in Kyôto, on October 4-6, 1989 (KAWAKATSU & MITCHELL, 1989 a).

Genus *Dugesia* GIRARD, 1850

Dugesia sp. (species of Sulawesi)

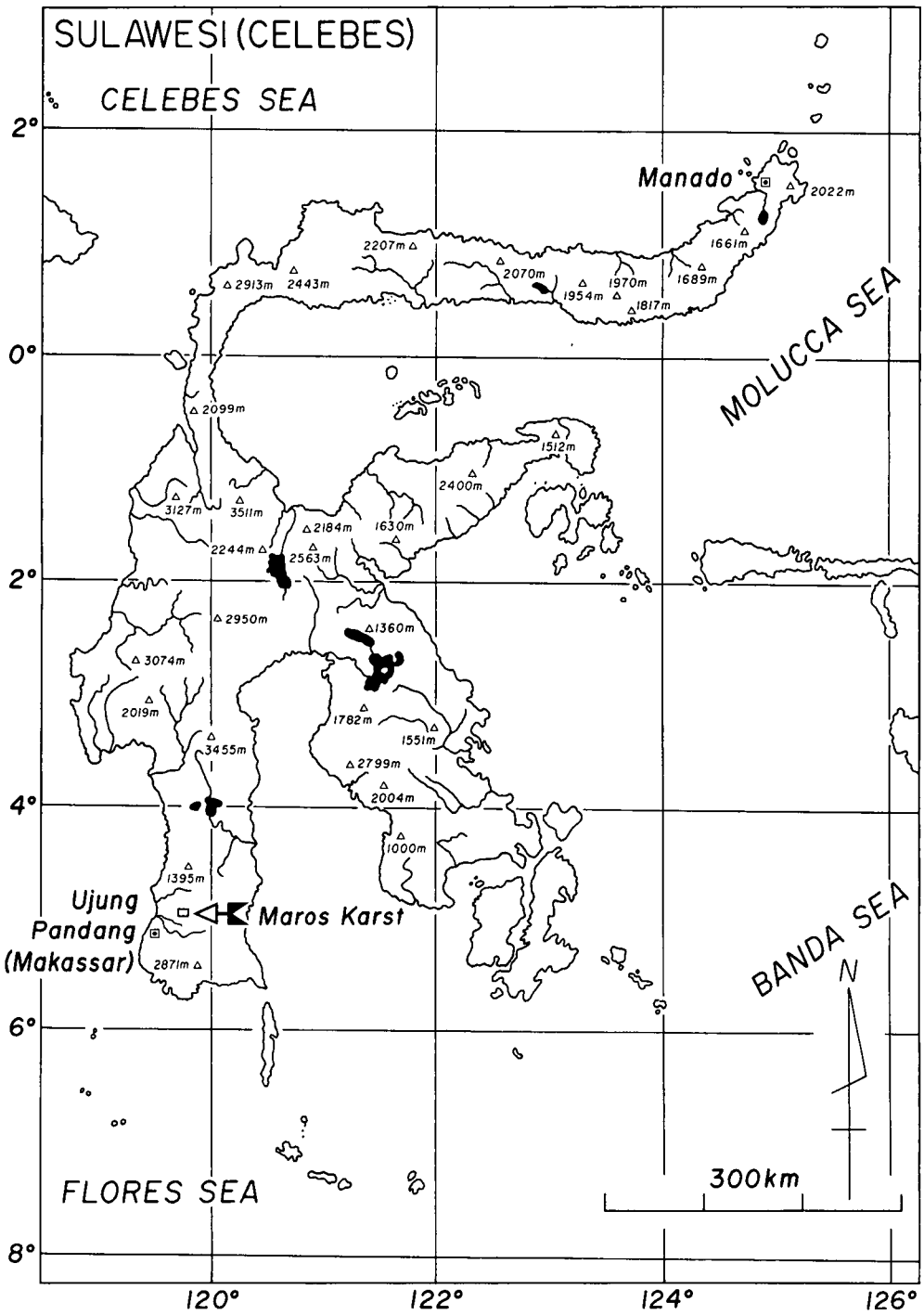


Fig. 1. Sketch map of Sulawesi (Celebes), Indonesia, showing the location of the Maros Karst.

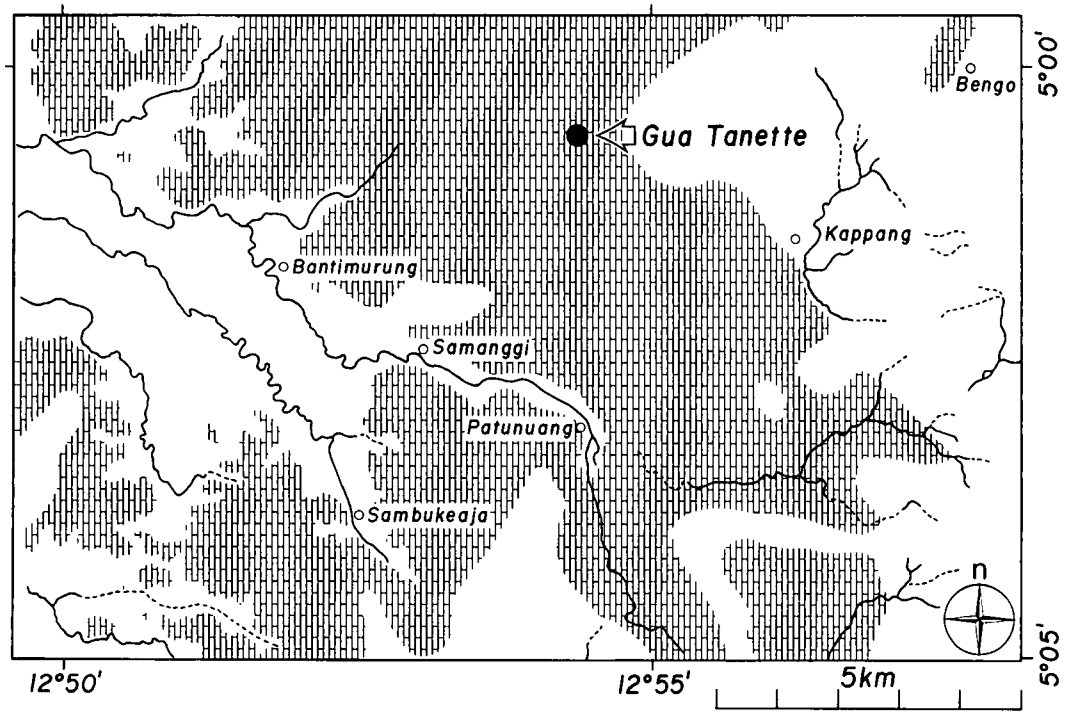


Fig. 2. The Maros Karst area and the location of Gua (Cave) Tanette (after the "Expédition Maros 1988" ; modified).

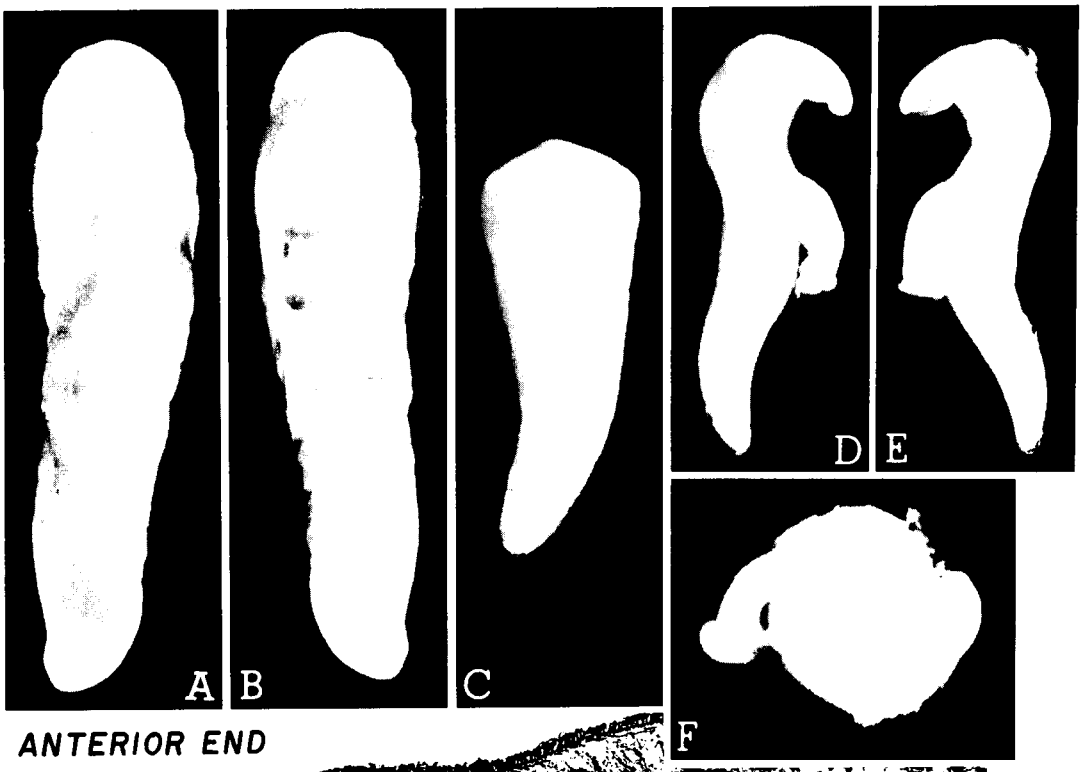
External features. The planarian is a small, slender, white, eyeless troglobite. Appearances of 3 preserved specimens are shown in Fig. 3 (A-F). The largest specimen is 7 mm long and 1 mm wide (Fig. 3 A and B). The anterior end of this specimen is rounded. In the second specimen (5 mm long by 0.9 mm wide ; Fig. 3 C-E), the head is strongly curved to the ventral side ; it shows a low triangular shape with a pair of bluntly pointed auricles. The posterior end of the body is bluntly pointed. The pharynx is situated at the middle of the body ; it measures one-fourth to one-fifth of the body length.

Examination with a high power stereomicroscope shows that the animal has barely perceptible pigmentation on the dorsal surface of the body. Sensory organs could not be seen laterally on the head.

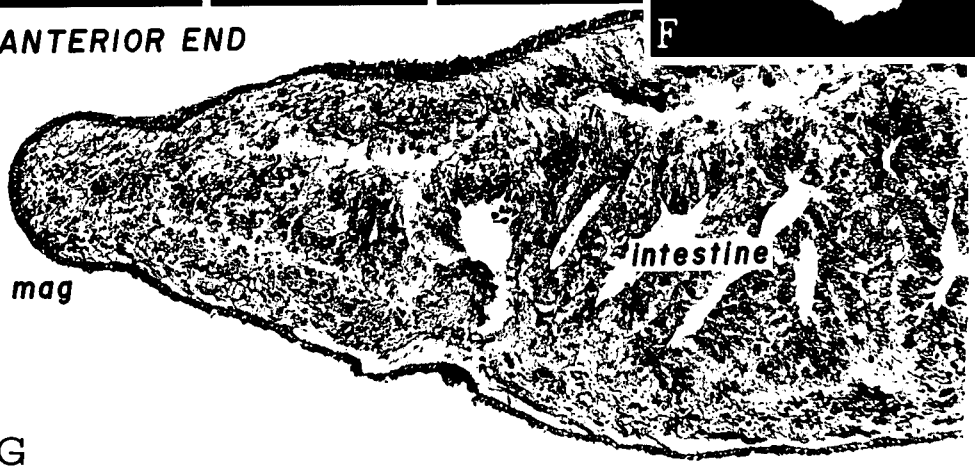
Internal features. Photomicrographs of the anterior, pharyngeal and posterior portions of the body taken from near the midsagittal plane of the Specimen No. 1977-a are shown in Fig. 3 (G-I). In this largest specimen, the anterior trunk of the intestine bears 14 to 15 lateral branches on each side ; each posterior trunk has 16 to 18 short lateral branches. The inner pharyngeal musculature consists of a thick circular layer adjacent to the ciliated epithelium of the pharynx lumen and a much thinner layer of longitudinal fibers. The outer pharyngeal musculature consists of two layers, a thin one of longitudinal fibers beneath the outer ciliated epithelium and a thin layer of circular fibers beneath the longitudinal ones (Fig. 3 I). Weakly erythrophilic marginal adhesive glands could be seen (Fig. 3 G and H).

Ovaries, testes and yolk glands were not found in any specimen.

Material. Three sets of serial sections of non-sexual specimens (Specimen Nos. 1976-a, -b,



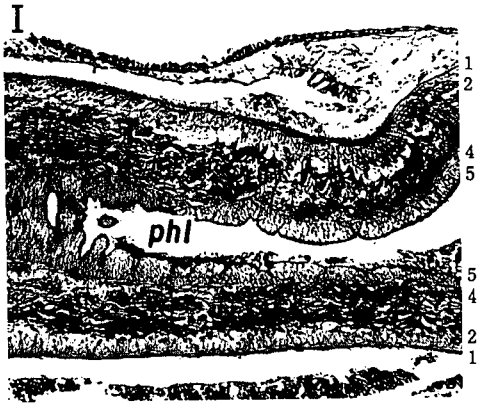
ANTERIOR END



G

H I

POSTERIOR END



1977-a) are retained in KAWAKATSU's laboratory, Fuji Women's College, Sapporo, Japan.

TAXONOMIC REMARKS

A total of 20 species of the genus *Dugesia* is now known from Southeast Asia (cf. KAWAKATSU & MITCHELL, 1989 b). Among them, the following 2 species are cave inhabitants : *Dugesia batuensis* BALL, 1970, from Batu Caves near Kuala Lumpur, Malaysia ; *Dugesia deharvengi* KAWAKATSU et MITCHELL, 1989, from Tham Kubio Cave, Thailand. The former seems to be a troglophilic species (for discussion, see KAWAKATSU & MITCHELL, 1989 b ; see also KAWAKATSU, MITCHELL, OKI, TAMURA & YUSSOF, 1989). The latter is a true troglobite completely lacking body pigmentation and eyes.

Dugesia sp. (species of Sulawesi) recorded in the present paper is the second record of a true troglobitic dugesiid species reported from Southeast Asia, if the authors' tentative classification is correct. The only reason for this identification is that one of the preserved specimens from Tanette Cave (No. 1976-a) has a blunt triangular head shape.

Mitchellia sarawakana KAWAKATSU et CHAPMAN, 1983, reported from Water Polo Cave, Sarawak, East Malaysia, is also an unpigmented, eyeless, delicate species. However, the head shape of this freshwater species seems to be different from that of *Dugesia* sp. (species of Sulawesi). A future taxonomic study of Sulawesian freshwater planarians based upon fully sexually mature specimens including both epigean and hypogean localities is necessary.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. Louis DEHARVENG, Laboratoire de Zoologie, Ecologie des Invertebres Terrestres, Université Paul Sabatier, Narbonne, Toulouse Cedex, France, for giving us with this interesting collection and for giving us further information about Gua (Cave) Tanette and its surrounding area.

SUMMARY

A small, white, eyeless troglobitic form of triclad Turbellaria was found inhabiting a freshwater pool in Tanette Cave, located in the Maros Karst of southwestern Sulawesi, Indonesia. This unidentifiable planarian appears to be the second recorded troglobitic *Dugesia* species from Southeast Asia.

REFERENCES

Fig. 3. *Dugesia* sp. (species of Sulawesi). A and B : Specimen No. 1977-a (A, dorsal ; B, ventral). C -E : Specimen No. 1976-a (C, ventral ; D and E, side views). F : Specimen No. 1976-b. All preserved specimens. G-I : Photomicrographs of parts of near midsagittal section (No. 1977-a). G, anterior end ; H, posterior end ; I, pharyngeal region. mag, marginal adhesive glands ; phl, pharynx lumen. 1, longitudinal fibers of outer muscle zone ; 2, circular fibers of outer muscle zone ; 4, longitudinal fibers of inner muscle zone ; 5, circular fibers of inner muscle zone.

ASSOCIATION PYRÉNÉENNE DE SPÈLÈOLOGIE, 1988. Expédition Maros 1988. Cited page 44 only.

BALL, I. R., 1970. Freshwater triclads (Turbellaria, Tricladida) from the Oriental region. Zool. Jour. Linnean Soc., 49 : 271-294+pls. 1-2. 1974. A contribution to the phylogeny and biogeography of the freshwater triclads (Platyhelminthes, Turebellaria). In : RISER, N. W. & M. P. MORSE (eds.), "*Libbie H. HYMAN Memorial Volume ····· Biology of the Turbellaria*", pp. 339-401. McGraw-Hill Book Co., New York, etc.

GIRARD, C., 1850. A brief account of the fresh-water planariae of the United States. Proc. Boston Soc. Nat. Hist., 3 : 264-265.

KAWAKATSU, M. & CHAPMAN, P., 1983. *Mitchellia sarawakana* gen. et sp. nov. (Turbellaria, Tricladida, Maricola), a new freshwater planaria from Water Polo Cave, Sarawak, East Malaysia. Jour. Speleol. Soc. Japan, 8 : 21-34.

KAWAKATSU, M. & MITCHELL, R. W., 1989 a. Karyological and taxonomic studies of *Dugesia* species in Southeast Asia. XVI. The two troglobitic species from Thailand and Sulawesi. Zool. Sci., 6. 1989 b. *Dugesia deharvengi* sp. nov., a new troglobitic freshwater planarian from Tham Kubio Cave, Thailand (Turbellaria ; Tricladida ; Paludicola). Bull. Biogeogr. Soc. Japan, 44 (7). 8 pages.

KAWAKATSU, M., MITCHELL, R. W., OKI, I., TAMURA, S. & YUSSOF, S., 1989. Taxonomic and karyological studies of *Dugesia batuensis* BALL, 1970 (Turbellaria, Tricladida, Paludicola), from Batu Caves, Malaysia. Jour. Speleol. Soc. Japan, 14.

* *

Addresses of the Authors :

Dr. Masaharu KAWAKATSU, Professor of Biology, Biological Laboratory, Fuji Women's College, Kita-16, Nishi-2, Kita-ku, Sapporo (Hokkaidô) 001, Japan.

Dr. Robert W. MITCHELL, Professor of Biology, Department of Biological Sciences, Texas Tech University, Lubbock, Texas 79409, U. S. A.

December 25, 1989.